

(19)



JAPANESE PATENT OFFICE

## PATENT ABSTRACTS OF JAPAN

(11) Publication number: **2002015904 A**(43) Date of publication of application: **18.01.02**(54) **ARRESTER**

of the zinc oxide element module.

## (57) Abstract

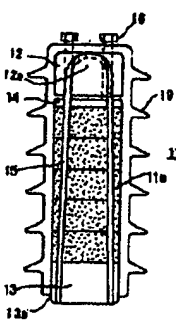
COPYRIGHT: (C)2002,JPO

**PROBLEM TO BE SOLVED:** To provide an arrester, in which a pressure force is applied uniformly to a zinc oxide element block, where a plurality of zinc oxide elements are laminated and its outer circumference is covered with a silicone rubber or another polymer.

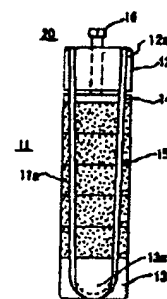
**SOLUTION:** An upper electrode, provided with a pressing means and an engaging part hanging a tractive member on its both sides, is arranged on the upper end face of a zinc oxide element block, formed by laminating a plurality of zinc oxide elements, with a pressing plate interposed, and a lower electrode provided with an engaging part hanging a tractive member on its both sides is arranged on the lower end face thereof. A tractive member, formed of insulation material such as a ring, is hooked criss crossed on the engaging parts of the upper and lower electrodes, and a pressure force is applied to the zinc oxide block by means of a pressing means so as to pull the lower electrode, with a pressure force being given to the zinc oxide element block, and a zinc oxide element being formed. In addition, an outer cover provided with folds having weatherability and flexibility is provided around the outer circumference



(a)



(b)



11: 酸化亜鉛素子ブロック 12: 上部電極  
13: 下部電極 14: 押圧板  
15: 牽引部材 16: 押圧ボルト  
17: 外被 20: 酸化亜鉛素子モジュール

(51) Int. Cl

**H01C 7/12**(21) Application number: **2000191967**(71) Applicant: **MITSUBISHI ELECTRIC CORP**(22) Date of filing: **27.06.00**(72) Inventor: **KAKO ISAO  
KOGA HIROYUKI**

BEST AVAILABLE COPY

(19)日本国特許庁 (J P)

(12) 公開特許公報 (A)

(11)特許出願公開番号

特開2002-15904

(P2002-15904A)

(43)公開日 平成14年1月18日(2002.1.18)

(51)Int.Cl.<sup>7</sup>  
H01C 7/12

識別記号

P I  
H01C 7/12

テーマコード(参考)  
5E034

審査請求 未請求 請求項の数3 OL (全6頁)

(21)出願番号 特願2000-191967(P2000-191967)

(22)出願日 平成12年6月27日(2000.6.27)

(71)出願人 00006013

三菱電機株式会社

東京都千代田区丸の内二丁目2番3号

(72)発明者 加来 勲

東京都千代田区丸の内二丁目2番3号 三

菱電機株式会社内

(72)発明者 古賀 広幸

東京都千代田区丸の内二丁目2番3号 三

菱電機株式会社内

(74)代理人 100093562

弁理士 児玉 俊英

Fターム(参考) 5E034 CA09 EA07 EB01 EB05 EC01  
ED02

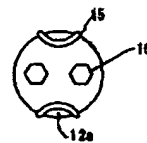
(54)【発明の名称】 避雷器

(57)【要約】

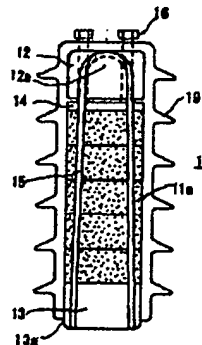
【課題】 複数の酸化亜鉛素子が積層され他酸化亜鉛素子ブロックの外周に、シリコンゴムまたは他のポリマーで外被が形成された避雷器の酸化亜鉛素子ブロックを押圧する押圧力が均等に押圧された避雷器を構成する。

【解決手段】 積層された複数の酸化亜鉛素子ブロックの上端面に押圧手段および両側部に牽引部材が懸架される係止部を備えた上部電極を押圧板を介して配置し、下端面に両側部に牽引部材が懸架される係止部を備えた下部電極を配置し、上部電極と下部電極の係止部の相互間に絶縁材料によりリング状に形成された牽引部材を挿掛けし、押圧手段により酸化亜鉛素子ブロックに押圧力を与えて下部電極を牽引することにより酸化亜鉛素子ブロックに押圧力を与えて酸化亜鉛素子モジュールを構成し、この酸化亜鉛素子モジュールの外周に耐候性と弾力性を備えた絶縁材料によりひだを有する形状に形成した外被を被せた。

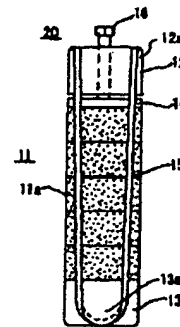
(a)



(a)



(b)



11 : 酸化亜鉛素子ブロック 12 : 上部電極  
13 : 下部電極 14 : 押圧板  
15 : 牽引部材 16 : 押圧ボルト  
19 : 外被 20 : 酸化亜鉛素子モジュール

## 【特許請求の範囲】

【請求項1】 複数の酸化亜鉛素子が積層された酸化亜鉛素子ブロックの上端面に、酸化亜鉛素子ブロックを押圧する押圧手段および両側部に牽引部材が懸架される係止部を備えた上部電極が押圧板を介して配置され、下端面に、両側部に牽引部材が懸架される係止部を備えた下部電極が配置され、上記上部電極と下部電極の係止部の相互間に抗張力がある絶縁材料によりリング状に形成された1個の牽引部材が挿掛けされ、上記押圧手段により上記酸化亜鉛素子ブロックに押圧力を与えて下部電極を牽引することにより酸化亜鉛素子ブロックに圧縮力が与えられて酸化亜鉛素子モジュールが構成され、該酸化亜鉛素子モジュールの外周には、耐候性と弾力性を備えた絶縁材料によりひだを有する形状に形成された外被が被せられていることを特徴とする避雷器。

【請求項2】 上部電極と下部電極の牽引部材が懸架される係止部は、牽引部材が酸化亜鉛素子ブロックの側部に均等間隔で懸架されるように形成されていることを特徴とする請求項1記載の避雷器。

【請求項3】 複数の酸化亜鉛素子が積層された酸化亜鉛素子上段ブロックと酸化亜鉛素子下段ブロックが直列に配置された中間に、両側部に一方の牽引部材の係止部と、この係止部に直交する方向の両側部に他方の牽引部材の係止部を備えた中間電極が配置され、上記酸化亜鉛素子上段ブロックの上端面に、酸化亜鉛素子上段ブロックを押圧する押圧手段を備え、両側部に牽引部材の係止部を備えた上部電極が押圧板を介して配置され、上記酸化亜鉛素子下段ブロックの下端面に、酸化亜鉛素子下段ブロックを押圧する押圧手段を備え、両側部に牽引部材の係止部を備えた下部電極が押圧板を介して配置され、上部電極と中間電極の係止部の相互間および中間電極と下部電極の係止部の相互間それぞれに独立して、抗張力がある絶縁材料によりリング状に形成された牽引部材が挿掛けされ、上部電極の押圧手段により酸化亜鉛素子上段ブロックに、下部電極の押圧手段により酸化亜鉛素子下段ブロックにそれぞれ押圧力を与えて中間電極をそれぞれ牽引することにより圧縮力が与えられて酸化亜鉛素子モジュールが構成され、該酸化亜鉛素子モジュールの外周に耐候性と弾力性を備えた絶縁材料によりひだを有する形状に形成された外被が被せられていることを特徴とする避雷器。

## 【発明の詳細な説明】

【0001】

【発明の属する技術分野】この発明は電力系統に発生する雷サージ、開閉サージ等の異常電圧を抑制し、回路に接続された電気機器を保護する酸化亜鉛素子を積層し、シリコンゴムまたは他のポリマー等の絶縁材料により形成された外被を被せた避雷器に関するものである。

【0002】

【従来の技術】酸化亜鉛素子が積層され、積層された酸

化亜鉛素子の外周にシリコンゴムまたは他のポリマー等の絶縁材料により形成された外被を被せた避雷器としては、例えば特開平8-45709号公報に開示されたものがある。その構成を図4に示す。図4(a)は断面図、図4(b)は酸化亜鉛素子モジュールの構成図、図4(c)は図4(a)のA-A部の断面図である。図において、1は複数の酸化亜鉛素子1aが積層された酸化亜鉛素子ブロック、2は上部電極であり、中心部には酸化亜鉛素子ブロック1に押圧力を与える押圧ねじが螺合されるねじが設けられている。

【0003】3は下部電極であり上部電極2と同様に形成されている。4は積層された酸化亜鉛素子ブロック1の上面と上部電極2の間、および酸化亜鉛素子ブロック1の下面と下部電極3の間に配置され、酸化亜鉛素子ブロック1に押圧力を均等に与える押圧板、5は上部電極2と下部電極3の間の四方に懸架され、下部電極3を牽引することにより酸化亜鉛素子ブロック1を押圧する絶縁材料によりリング状に形成された牽引部材である。

【0004】6は上部電極2の中心部のねじに螺合され、締め付けることにより酸化亜鉛素子ブロック1に押圧力を与える押圧ボルト、7は下部電極3の中心部のねじに螺合され、締め付けることにより酸化亜鉛素子ブロック1に押圧力を与える押圧ボルト、8は牽引部材5の外周に巻き付けられ、酸化亜鉛素子1aが破壊したときに周囲に飛散するのを防止する破裂防止部材である。10は上記1〜8で構成された酸化亜鉛素子モジュールである。9は酸化亜鉛素子モジュール10の外周を覆うシリコンゴムまたは他のポリマー等の絶縁材料によりひだを有する形状に形成された外被である。

【0005】このように構成された避雷器は、酸化亜鉛素子1が強固に支持され、異常電圧を吸収して流れる電流が過大となり電氣的／熱的に破壊したときに周囲に飛散することが防止される。

【0006】

【発明が解決しようとする課題】以上のように構成された従来の避雷器は、酸化亜鉛素子ブロック1を押圧する牽引部材5が周囲の四方に配置されているので、圧縮力を均等に与えるためには各牽引部材5の長さや荷重に対する伸びなどの性能のバランスがとれていることが必要であるが、実際の製品にはばらつきがあるものであり、四個の牽引部材5の長さ、荷重に対する伸びなどに差があると、上下それぞれ1本の押圧ボルト6、7で締め付けられる図4の構成では、酸化亜鉛素子ブロック1に与えられる押圧力は偏ることとなり、酸化亜鉛素子ブロック1の積層状態が湾曲したり、さらには酸化亜鉛素子1aがはみ出すなどの問題点があった。

【0007】この発明は、上記問題点を解消するためになされたものであり、積層された酸化亜鉛素子を押圧する押圧力が均等に与えられ、積層状態が湾曲状態になったり、はみ出すようなことが回避される避雷器を提供す

ることを目的とする。

【0008】

【課題を解決するための手段】この発明の請求項1の係る避雷器は、積層された複数の酸化亜鉛素子ブロックの上端面に押圧手段および両側部に牽引部材が懸架される係止部を備えた上部電極を押圧板を介して配置し、下端面に両側部に牽引部材が懸架される係止部を備えた下部電極を配置し、上部電極と下部電極の係止部の相互間に抗張力がある絶縁材料によりリング状に形成された牽引部材を挿掛けし、押圧手段により酸化亜鉛素子ブロックに押圧力を与えて下部電極を牽引することにより酸化亜鉛素子ブロックに押圧力を与えて酸化亜鉛素子モジュールを構成し、この酸化亜鉛素子モジュールの外周に耐候性と弾力性を備えた絶縁材料によりひだを有する形状に形成した外被を被せたものである。

【0009】この発明の請求項2の係る避雷器は、請求項1の構成の上部電極と下部電極との間に牽引部材が懸架される係止部は、牽引部材が酸化亜鉛素子ブロックの側部に均等間隔で懸架されるように形成したものである。

【0010】この発明の請求項3の係る避雷器は、複数の酸化亜鉛素子が積層された酸化亜鉛素子上段ブロックと酸化亜鉛素子下段ブロックが直列に配置された中間に、両側部に一方の牽引部材の係止部と、この係止部に直交する方向の両側部に他方の牽引部材の係止部を備えた中間電極を配置し、酸化亜鉛素子上段ブロックの上端面に、酸化亜鉛素子上段ブロックを押圧する押圧手段を備え、両側部に牽引部材の係止部を備えた上部電極を押圧板を介して配置し、酸化亜鉛素子下段ブロックの下端面に、酸化亜鉛素子下段ブロックを押圧する押圧手段と両側部に牽引部材の係止部を備えた下部電極を押圧板を介して配置し、上部電極と中間電極の係止部の相互間および中間電極と下部電極の係止部の相互間それぞれに独立して、抗張力がある絶縁材料によりリング状に形成された牽引部材を挿掛けし、上部電極の押圧手段により酸化亜鉛素子上段ブロックに、下部電極の押圧手段により酸化亜鉛素子下段ブロックにそれぞれ押圧力を与えて中間電極をそれぞれ牽引することにより押圧力を与えて酸化亜鉛素子モジュールを構成し、この酸化亜鉛素子モジュールの外周に耐候性と弾力性を備えた絶縁材料によりひだを有する形状に形成した外被を被せたものである。

【0011】

【発明の実施の形態】実施の形態1. 実施の形態1の構成を図1に示す。図1(a)は避雷器の断面図、図1(b)は酸化亜鉛素子モジュールの側面図、図1(c)は平面図である。図において、11は酸化亜鉛素子11aが積層された酸化亜鉛素子ブロック、12は積層された酸化亜鉛素子ブロック11の上端面に押圧板14を介して配置された上部電極であり、両側部に下記の牽引部材15の係止部12aが設けられ、軸方向に酸化亜鉛素子

子ブロック11を押圧する押圧ボルトが装着されるめねじが設けられている。13は酸化亜鉛素子ブロック11の下端面に配置された下部電極であり、上部電極12と同様に両側部に牽引部材15の係止部13aが設けられている。上部電極12の係止部12aおよび下部電極13の係止部13aは、酸化亜鉛素子ブロック11に接する反対面のそれぞれの側部に牽引部材15がU字状に軸方向に懸架できるように図示の位置に切り込みを入れて形成されている。

10 【0012】15は上部電極12の係止部12aと下部電極13の係止部13aの相互間に懸架された牽引部材であり、例えばガラス繊維またはアラミド繊維などの抗張力がある繊維を所定の大きさに巻回して樹脂を含浸させる方法にてリング状(エンドレス)に形成されている。16はねじ込むことにより押圧板14を押す、酸化亜鉛素子ブロック11に押圧力を与える押圧手段としての押圧ボルトである。20は11~16で構成された酸化亜鉛素子モジュールである。19は酸化亜鉛素子モジュール20の外周を覆う外被であり、シリコンゴムまたは他のポリマー等の絶縁材料によりひだを有する形状に形成されている。

20 【0013】このように構成された避雷器は、酸化亜鉛素子ブロック11がリング状に形成された1個の牽引部材15を上部電極12の係止部12aと下部電極13の係止部13aの間に挿掛けし、牽引部材15の酸化亜鉛素子ブロックの側部の長さが同一になるように配分を調整し、押圧ボルト16をねじ込んで酸化亜鉛素子ブロック11に押圧力を与えて下部電極12を牽引することにより、酸化亜鉛素子ブロック11には均等な押圧力を与えられ、積層状態が湾曲状態になったり、はみ出すようなことが回避された安定した避雷器が構成できる。

30 【0014】実施の形態2. 実施の形態2の構成を図2に示す。実施の形態2は実施の形態1とほぼ同一の構成であり、酸化亜鉛素子ブロックに押圧力を与える牽引部材の酸化亜鉛素子ブロックの側部に等間隔に配置できるように構成したものである。図2(a)は避雷器の断面図、図2(b)は酸化亜鉛素子モジュールの構成図、図2(c)は平面図である。図において、酸化亜鉛素子ブロック11、押圧板14、牽引部材15、押圧ボルト16および外被19は実施の形態1の図1と同一または同一機能の部分である。

40 【0015】22は酸化亜鉛ブロック11の上端面に押圧板14を介して配置された上部電極であり、押圧手段としての押圧ボルトが螺着できるようにねじが設けられ、両側部に牽引部材15の係止部22aが設けられ、係止部22aは牽引部材15が軸方向にU字状に懸架され酸化亜鉛素子ブロック11の側部で等間隔で平行に配置されるように切り込みを入れて形成されている。23は酸化亜鉛ブロック11の下端面に配置された上部電極であり、上部端子22と同様に係止部23aが形成され

ている。30は11、14~16、22、23で構成された酸化亜鉛素子モジュールである。酸化亜鉛素子モジュール30が組み立てられた後、酸化塩素素子モジュールの外周にシリコンゴムまたは他のポリマー等の絶縁材料によりひだを有する形状に形成された外被が被せられている。

【0016】この構成においては、リング状に形成された牽引部材15が、酸化亜鉛素子ブロック11の周囲に四本が同一長さになるように調整され、酸化亜鉛素子ブロック11の側部に等間隔に配置されるので、酸化亜鉛素子ブロック11に加えらるる圧力は実施の形態1の場合よりも均一となり、酸化亜鉛素子11aに横方向から荷重が加わってもはみ出すようなことが回避された実施の形態1よりも安定した避雷器が構成できる。

【0017】実施の形態3。実施の形態3の構成を図3に示す。実施の形態3は、積層した酸化亜鉛素子ブロックが上段、下段の二段に配置される場合の実施の形態である。図3(a)は避雷器の断面図、図3(b)は酸化亜鉛素子モジュールの構成図、図3(c)は避雷器の上面からみた平面図である。図において、31は複数の酸化亜鉛素子11aが積層された酸化亜鉛素子上段ブロック、41は酸化亜鉛素子11aが積層された酸化亜鉛素子下段ブロックである。

【0018】32は酸化亜鉛素子上段ブロック31の上端面に押圧板34を介して配置され、両側部に下記する牽引部材の係止部32aが設けられ、上面から酸化亜鉛素子ブロック31を押圧する押圧手段としての押圧ボルトが螺着されるねじが設けられた上部電極、33は酸化亜鉛素子上段ブロック31と酸化亜鉛素子下段ブロック41の間に配置され、両側部に上方の下記の牽引部材35を懸架する係止部33aが設けられ、この係止部33aに直交する方向の両側部に下方の下記の牽引部材45を懸架する係止部33bが設けられた中間電極、43は酸化亜鉛素子下段ブロック41の下端面に押圧板34を介して配置された上記上部電極と同様に形成された下部電極である。

【0019】35は上部電極32の係止部32aと中間電極33の一方の係止部33aとの相互間に掛付けされた実施の形態1の牽引部材15と同じように製作された例えばガラス繊維またはアラミド繊維などの抗張力がある繊維を所定の大きさのリング状に巻回し、樹脂を含浸させて硬化する方法にてリング状に形成された牽引部材、45は中間電極33の他方の係止部33bと下部電極43の係止部43aの相互間に掛付けされた35と同様に形成された牽引部材である。

【0020】36は上部電極32のねじに螺着され、ねじ込むことにより押圧板34を押圧して酸化亜鉛素子ブロック31に押圧力を与える押圧手段としての押圧ボルト、46は下部電極43のねじに螺着され、ねじ込むことにより押圧板34を押圧して酸化亜鉛素子ブロック4

1に押圧力を与える押圧手段としての押圧ボルトである。40は31~36、41、43、45、46で構成された酸化亜鉛素子モジュールである。39は酸化亜鉛素子モジュール40の外周を覆う外被であり、シリコンゴムまたは他のポリマー等の絶縁材料によりひだを有する形状に形成されている。

【0021】この構成においては、酸化亜鉛素子11aを積層した酸化亜鉛素子上段ブロック31と酸化亜鉛素子下段ブロック41の二段に配置した比較的高い電圧階級の場合の構成であり、上部電極12と中間電極33および中間電極33と下部電極43との間にそれぞれ個別に牽引部材35、45を掛付けして酸化亜鉛素子上部ブロック31、酸化亜鉛素子下段ブロック41にそれぞれに押圧力を加えたことにより、高い電圧階級避雷器においても、酸化亜鉛素子上段ブロック31および酸化亜鉛素子下段ブロック41それぞれに均等な押圧力が与えられているので、積層状態が湾曲状態になったり、はみ出したりすることが回避された安定した高電圧の避雷器が構成できる。

【0022】

【発明の効果】この発明の請求項1の係る避雷器は、積層された複数の酸化亜鉛素子ブロックの上端面に押圧板を介して押圧手段を備えた上部電極の係止部と下端面に配置された下部電極の係止部の間に牽引部材を掛付けし、上部電極の押圧ボルトを締め付けることにより下部電極を牽引して酸化亜鉛素子ブロックに押圧力を加えた構成としたので、酸化亜鉛素子ブロックに均等な押圧力が与えられ、積層状態が湾曲状態になったり、はみ出したりすることが回避された安定した避雷器が構成できる。

【0023】この発明の請求項2の係る避雷器は、請求項1の構成の上部電極の係止部および下部電極の係止部は、掛付けされた牽引部材が酸化亜鉛素子の外周に均等に配置されるように、上部電極および下部電極の係止部を形成したので、酸化亜鉛素子ブロックに加えられた押圧力はより均一になり、酸化亜鉛素子に横方向から荷重が加わってもはみ出すようなことが回避された安定した避雷器が構成できる。

【0024】この発明の請求項3の係る避雷器は、複数の酸化亜鉛素子が積層された酸化亜鉛素子上段ブロックと酸化亜鉛素子下段ブロックを直列に配置した中間に、酸化亜鉛素子上段ブロックを牽引する牽引部材の係止部と酸化亜鉛素子下段ブロックを牽引する牽引部材の係止部を備えた中間電極を配置し、酸化亜鉛素子上段ブロックの上端面に、酸化亜鉛素子上段ブロックを押圧する押圧手段と側部に牽引部材の係止部を備えた上部電極を配置し、酸化亜鉛素子下段ブロックの下端面に、押圧手段を備えた両側部に牽引部材の係止部を備えた下部電極を押圧板を介して配置し、上部電極の係止部と中間電極の一方の係止部の相互間および中間電極の他方の係止部と

7

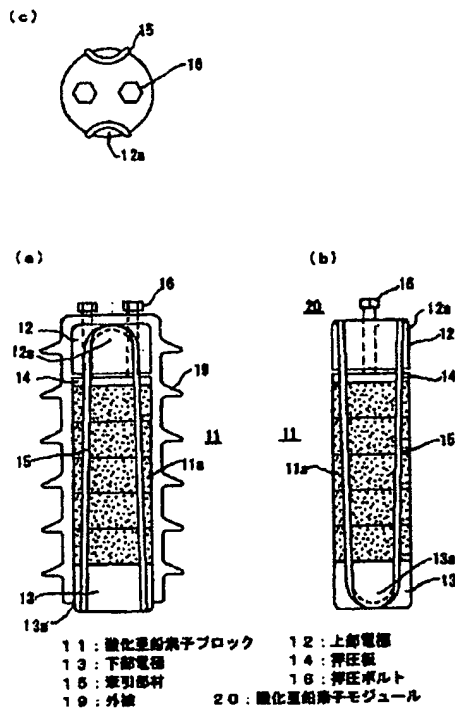
下部電極の係止部の相互間それぞれに独立して抗張力がある絶縁材料によりリング状に形成された牽引部材を挿掛けし、上部電極および下部電極のそれぞれの押圧手段により、酸化亜鉛素子上段ブロックおよび酸化亜鉛素子下段ブロックそれぞれに押圧力を与えて中間電極を牽引するように酸化亜鉛素子モジュールを構成したので、高い電圧階級避雷器においても、それぞれのブロックに均等な押圧力が与えられ、積層状態が湾曲状態になったり、はみ出したりすることが回避された安定した高電圧の避雷器が構成できる。

【図面の簡単な説明】

【図1】 実施の形態1の避雷器の構成図であり、(a)は断面図、(b)は酸化亜鉛素子モジュールの構成図、(c)は平面図である。

【図2】 実施の形態2の避雷器の構成図であり、(a)は断面図、(b)は酸化亜鉛素子モジュールの構成図、(c)は平面図である。

【図1】



8

成図、(c)は平面図である。

【図3】 実施の形態3の避雷器の構成図であり、

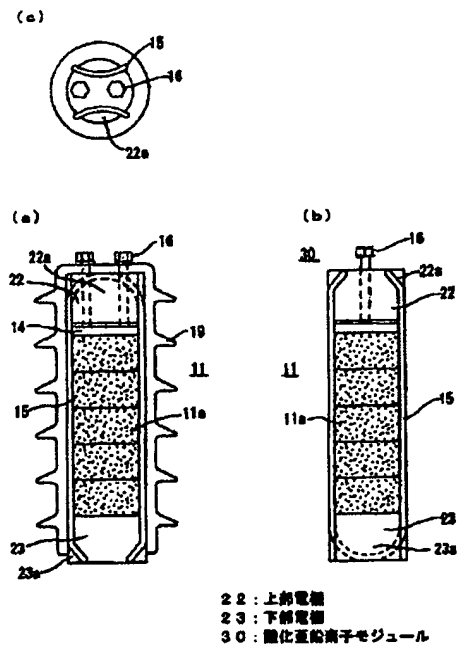
(a)は断面図、(b)は酸化亜鉛素子モジュールの構成図、(c)は平面図である。

【図4】 従来の避雷器の構成図であり(a)は断面図、(b)は酸化亜鉛素子モジュールの構成図である。

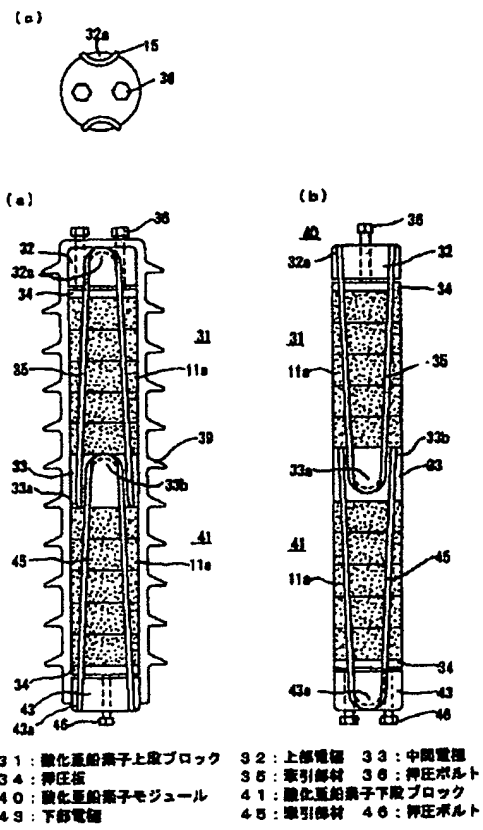
【符号の説明】

- 11 酸化亜鉛素子ブロック、12 上部電極、13 下部電極、14 押圧板、15 牽引部材、16 押圧ボルト、19 外被、20 酸化亜鉛素子モジュール、22 上部電極、23 下部電極、31 酸化亜鉛素子上段ブロック、32 上部電極、33 中間電極、34 押圧板、35 牽引部材、36 押圧ボルト、39 外被、40 酸化亜鉛素子モジュール、41 酸化亜鉛素子下段ブロック、43 下部電極、45 牽引部材、46 押圧ボルト。

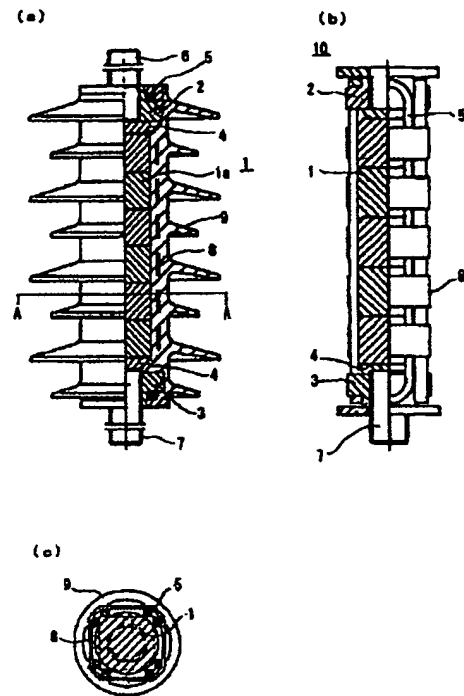
【図2】



【図3】



【図4】



**\* NOTICES \***

JPO and NCIPi are not responsible for any damages caused by the use of this translation.

1. This document has been translated by computer. So the translation may not reflect the original precisely.
2. \*\*\*\* shows the word which can not be translated.
3. In the drawings, any words are not translated.

---

**CLAIMS**

---

[Claim(s)]

[Claim 1] To the upper limit side of the zinc oxide component block with which the laminating of two or more zinc oxide components was carried out The up electrode equipped with the stop section by which the suspension of the towage member is carried out to the press means and the both-sides section which press a zinc oxide component block is arranged through a press plate. The lower electrode which equipped the lower limit side with the stop section by which the suspension of the towage member is carried out to the both-sides section is arranged. Tucking up its sleeves with a cord of the one towage member formed in the shape of a ring of the insulating material which has tensile strength between the stop sections of the above-mentioned up electrode and a lower electrode is carried out. By giving thrust to the above-mentioned zinc oxide component block with the above-mentioned press means, and leading a lower electrode, compressive force is given to a zinc oxide component block, and a zinc oxide component module is constituted. The lightning arrester characterized by putting the jacket formed in the configuration which has a rib by the insulating material equipped with weatherability and resiliency on the periphery of this zinc oxide component module.

[Claim 2] The stop section to which the suspension of the towage member of an up electrode and a lower electrode is carried out is a lightning arrester according to claim 1 characterized by being formed so that the suspension of the towage member may be carried out to the flank of a zinc oxide component block at equal spacing.

[Claim 3] In the middle arranged at the serial, the zinc oxide component upper case block and zinc oxide component lower-berth block with which the laminating of two or more zinc oxide components was carried out in the both-sides section The stop section of one towage member,



**\* NOTICES \***

JPO and NCIPi are not responsible for any damages caused by the use of this translation.

1. This document has been translated by computer. So the translation may not reflect the original precisely.
2. \*\*\*\* shows the word which can not be translated.
3. In the drawings, any words are not translated.

---

**DETAILED DESCRIPTION**

---

**[Detailed Description of the Invention]****[0001]**

**[Field of the Invention]** This invention controls abnormal voltage generated in electric power system, such as a lightning surge and a switching surge, carries out the laminating of the zinc-oxide component which protects the electrical machinery and apparatus connected to the circuit, and relates to the lightning arrester on which the jacket formed of insulating materials, such as silicone rubber or other polymers, was put.

**[0002]**

**[Description of the Prior Art]** As a lightning arrester on which the jacket which the laminating of the zinc-oxide component was carried out, and was formed in the periphery of the zinc-oxide component by which the laminating was carried out of insulating materials, such as silicone rubber or other polymers, was put, there are some which were indicated by JP,8-45709,A, for example. The configuration is shown in drawing 4. Drawing 4 (a) is [ the block diagram of a zinc oxide component module and drawing 4 R> 4 (c) of a sectional view and drawing 4 (b) ] the sectional views of the A-A section of drawing 4 (a). In drawing, the zinc oxide component block with which the laminating of the zinc oxide component 1a of plurality [ 1 ] was carried out, and 2 are up electrodes, and \*\*\*\* in which press \*\*\*\* which gives thrust to the zinc oxide component block 1 is screwed is prepared in the core.

**[0003]** 3 is a lower electrode and is formed like the up electrode 2. It is the towage member formed in the shape of a ring of the insulating material which presses the zinc oxide component block 1 by arranging 4 between the top face of the zinc oxide component block 1 by which the laminating was carried out, and the up electrode 2, and between the inferior surface of tongue of the zinc oxide component block 1, and the lower electrode 3, carrying out the suspension of the press plate which gives thrust equally to the zinc oxide component block 1, and 5 to the four way type between the up electrode 2 and the lower electrode 3, and leading the lower electrode 3.

**[0004]** When 6 is screwed in the screw thread of the core of the up electrode 2, the press bolt which gives thrust to the zinc oxide component block 1 by binding tight, and 7 are screwed in the screw thread of the core of the lower electrode 3, the press bolt which gives thrust to the zinc oxide component block 1 by binding tight, and 8 are twisted around the periphery of the towage member 5 and zinc oxide component 1a breaks, it is the burst prevention member which prevents dispersing around. 10 is the zinc oxide component module which consisted of the above 1-8. 9 is the jacket formed in the configuration which has a rib by insulating materials, such as wrap silicone rubber or other polymers, in the periphery of the zinc oxide component module 10.

**[0005]** Thus, dispersing around is prevented, when the zinc-oxide component 1 is supported firmly, and becomes excessive [ the current which absorbs abnormal voltage and flows ] and the constituted lightning arrester is destroyed electrically/thermally.

**[0006]**

**[Problem(s) to be Solved by the Invention]** Although the conventional lightning arrester constituted as mentioned above needs have balanced engine performance, such as elongation over the die length and

the load of each towage member 5, in order to give compressive force equally since the towage member 5 which presses the zinc oxide component block 1 is arranged at the surrounding four way type. If there is dispersion in an actual product and there is a difference in the elongation over the die length of four towage members 5, and a load etc. With the configuration of drawing 4 bound tight with the press bolts 6 and 7 of each-one upper and lower sides, the thrust given to the zinc oxide component block 1 will incline, and the laminating condition of the zinc oxide component block 1 curved, and it had troubles, like zinc oxide component 1a overflows further.

[0007] The thrust which is made in order to cancel the above-mentioned trouble, and presses the zinc-oxide component by which the laminating was carried out is given equally, a laminating condition will be in a curve condition, or this invention will aim to let what overflows offer the lightning arrester avoided.

[0008]

[Means for Solving the Problem] The lightning arrester which claim 1 of this invention requires arranges the up electrode which equipped the upper limit side of two or more zinc oxide component blocks by which the laminating was carried out with the stop section by which the suspension of the towage member is carried out to a press means and the both-sides section through a press plate. The lower electrode which equipped the lower limit side with the stop section by which the suspension of the towage member is carried out to the both-sides section is arranged. The towage member formed in the shape of a ring of the insulating material which has tensile strength between the stop sections of an up electrode and a lower electrode. A cross multiplication opium poppy, By giving thrust to a zinc oxide component block with a press means, and leading a lower electrode, give thrust to a zinc oxide component block and a zinc oxide component module is constituted. The jacket formed in the configuration which has a rib by the insulating material which equipped the periphery of this zinc oxide component module with weatherability and resiliency is put.

[0009] The stop section by which, as for the lightning arrester which claim 2 of this invention requires, the suspension of the towage member is carried out between the up electrode of the configuration of claim 1 and a lower electrode is formed so that the suspension of the towage member may be carried out to the flank of a zinc oxide component block at equal spacing.

[0010] The zinc oxide component upper case block and zinc oxide component lower-berth block with which the laminating of two or more zinc oxide components was carried out the lightning arrester which claim 3 of this invention requires in the both-sides section in the middle arranged at the serial. The stop section of one towage member, The bipolar electrode which equipped with the stop section of the towage member of another side the both-sides section of the direction which intersects perpendicularly with this stop section is arranged. The upper limit side of a zinc oxide component upper case block is equipped with a press means to press a zinc oxide component upper case block. The up electrode which equipped the both-sides section with the stop section of a towage member is arranged through a press plate. To the lower limit side of a zinc oxide component lower-berth block, the lower electrode which equipped with the stop section of a towage member a press means to press a zinc oxide component lower-berth block, and the both-sides section is arranged through a press plate. It becomes independent between the stop sections of an up electrode and a bipolar electrode, and between [ each ] the stop sections of a bipolar electrode and a lower electrode. The towage member formed in the shape of a ring of the insulating material with tensile strength. A cross multiplication opium poppy, By giving thrust to a zinc oxide component lower-berth block with the press means of a lower electrode, respectively, and leading a bipolar electrode to a zinc oxide component upper case block with the press means of an up electrode, respectively, give thrust and a zinc oxide component module is constituted. The jacket formed in the configuration which has a rib by the insulating material which equipped the periphery of this zinc oxide component module with weatherability and resiliency is put.

[0011]

[Embodiment of the Invention] The configuration of the gestalt 1 of gestalt 1. implementation of operation is shown in drawing 1. Drawing 1 (a) is [ the side elevation of a zinc oxide component module and drawing 1 (c) of the sectional view of a lightning arrester and drawing 1 (b) ] top views. In

drawing, it is the up electrode arranged through the press plate 14 in the zinc oxide component block with which, as for 11, the laminating of the zinc oxide component 11a was carried out, and the upper limit side of the zinc oxide component block 11 with which the laminating of 12 was carried out, and the female screw with which it is equipped with the press bolt with which stop section 12a of the towage member 15 of the following [ section / both-sides ] is prepared, and presses the zinc oxide component block 11 to shaft orientations is formed. 13 is a lower electrode arranged in the lower limit side of the zinc oxide component block 11, and stop section 13a of the towage member 15 is prepared in the both-sides section like the up electrode 12. Slitting is put into the location of illustration and stop section 12a of the up electrode 12 and stop section 13a of the lower electrode 13 are formed in it so that the suspension of the towage member 15 can be carried out to shaft orientations in the shape of U character at each flank of the opposite side which touches the zinc oxide component block 11.

[0012] 15 is the towage member by which suspension was carried out between stop section 12a of the up electrode 12, and stop section 13a of the lower electrode 13, for example, is formed in the shape of a ring (endless) by the approach of winding fiber with tensile strength, such as a glass fiber or an aramid fiber, around predetermined magnitude, and infiltrating resin. 16 is a press bolt as a press means to push the press plate 14 and to give thrust to the zinc oxide component block 11, by thrusting. 20 is the zinc oxide component module which consisted of 11-16. 19 is a wrap jacket about the periphery of the zinc oxide component module 20, and is formed in the configuration which has a rib by insulating materials, such as silicone rubber or other polymers.

[0013] The constituted lightning arrester one towage member 15 in which the zinc oxide component block 11 was formed in the shape of a ring between stop section 12a of the up electrode 12, and stop section 13a of the lower electrode 13 Thus, a cross multiplication opium poppy, By adjusting allocation so that the die length of the flank of a zinc oxide component block of the towage member 15 may become the same, screwing in the press bolt 16, giving thrust to the zinc oxide component block 11, and leading the lower electrode 12 Equal thrust is given to the zinc oxide component block 11, a laminating condition can be in a curve condition, or the stable lightning arrester with which what overflows was avoided can be constituted.

[0014] The configuration of the gestalt 2 of gestalt 2. implementation of operation is shown in drawing 2 . The gestalt 2 of operation is the almost same configuration as the gestalt 1 of operation, and it is constituted so that it can arrange at equal intervals to the flank of a zinc oxide component block of a towage member which gives thrust to a zinc oxide component block. Drawing 2 (a) is [ the block diagram of a zinc oxide component module and drawing 2 R> 2 (c) of the sectional view of a lightning arrester and drawing 2 (b) ] top views. In drawing, the zinc oxide component block 11, the press plate 14, the towage member 15, the press bolt 16, and a jacket 19 are the parts of the same as that of drawing 1 of the gestalt 1 of operation, or the same function.

[0015] 22 is an up electrode arranged through the press plate 14 in the upper limit side of the zinc oxide block 11. \*\*\*\* is established so that the press bolt as a press means can be screwed on, and stop section 22a of the towage member 15 is prepared in the both-sides section. The suspension of the towage member 15 is carried out to shaft orientations at the shape of U character, stop section 22a is the flank of the zinc oxide component block 11, and slitting is put in and it is formed so that it may be arranged in parallel by regular intervals. 23 is an up electrode arranged in the lower limit side of the zinc oxide block 11, and stop section 23a is formed like the up terminal 22. 30 is 11, 14-16, and the zinc oxide module that consisted of 22 and 23. After the zinc oxide component module 30 is assembled, the jacket formed in the configuration which carries out chlorine oxide and has a rib by insulating materials, such as silicone rubber or other polymers, on a modular periphery is put.

[0016] Since it is adjusted so that the towage member 15 formed in the shape of a ring may become the perimeter of the zinc oxide component block 11 in this configuration and four may become the same die length, and it is arranged at equal intervals at the flank of the zinc oxide component block 11 The thrust applied to the zinc oxide component block 11 becomes more uniform than the case of the gestalt 1 of operation, and the lightning arrester by which what overflows even if a load joins zinc oxide component 11a from a longitudinal direction was stabilized rather than the gestalt 1 of the avoided operation can be

constituted.

[0017] The configuration of the gestalt 3 of gestalt 3. implementation of operation is shown in drawing 3. The gestalt 3 of operation is a gestalt of operation in case the zinc oxide component block which carried out the laminating is arranged in two steps, an upper case and the lower berth. It is the top view where drawing 3 (a) saw the sectional view of a lightning arrester, and drawing 3 (b) saw the block diagram of a zinc oxide component module, and drawing 3 (c) from the top face of a lightning arrester. In drawing, the zinc oxide component upper case block with which the laminating of the zinc oxide component 11a of plurality [ 31 ] was carried out, and 41 are the zinc oxide component lower-berth blocks with which the laminating of the zinc oxide component 11a was carried out.

[0018] 32 is arranged through the press plate 34 in the upper limit side of the zinc oxide component upper case block 31. The up electrode with which stop section 32a of the towage member which carries out the following to the both-sides section was prepared, and \*\*\*\* on which the press bolt as a press means to press the zinc oxide component block 31 from a top face is screwed was established, 33 is arranged between the zinc oxide component upper case block 31 and the zinc oxide component lower-berth block 41. Stop section 33a which carries out the suspension of the upper following towage member 35 to the both-sides section is prepared. The bipolar electrode with which stop section 33b which carries out the suspension of the downward following towage member 45 to the both-sides section of the direction which intersects perpendicularly with this stop section 33a was prepared, and 43 are the above-mentioned up electrode arranged through the press plate 34 in the lower limit side of the zinc oxide component lower-berth block 41, and the lower electrode formed similarly.

[0019] 35 the fiber which was manufactured like the towage member 15 of the gestalt 1 of the operation by which tucking up its sleeves with a cord was carried out between stop section 32a of the up electrode 32, and one stop section 33a of a bipolar electrode 33 and which has tensile strength, such as a glass fiber or an aramid fiber, for example in the shape of [ of predetermined magnitude ] a ring Winding, The towage member formed in the shape of a ring by the approach of infiltrating resin and hardening and 45 are the towage members formed like 35 by which tucking up their sleeves with a cord was carried out between stop section 33b of another side of a bipolar electrode 33, and stop section 43a of the lower electrode 43.

[0020] It is a press bolt as a press means for 36 to be screwed on the screw thread of the up electrode 32, and for the press bolt as a press means to press the press plate 34 and to give thrust to the zinc oxide component block 31 by thrusting, and 46 to be screwed on the screw thread of the lower electrode 43, to press the press plate 34 by thrusting, and to give thrust to the zinc oxide component block 41. 40 is 31-36, and the zinc oxide component module that consisted of 41, 43, 45, and 46. 39 is a wrap jacket about the periphery of the zinc oxide component module 40, and is formed in the configuration which has a rib by insulating materials, such as silicone rubber or other polymers.

[0021] It is a configuration in the case of a comparatively high electrical-potential-difference class stationed in this configuration to two steps, the zinc oxide component upper case block 31 which carried out the laminating of the zinc oxide component 11a, and the zinc oxide component lower-berth block 41. It also sets to a high electrical-potential-difference class lightning arrester by having carried out tucking up its sleeves with a cord of the towage members 35 and 45 according to the individual between the up electrode 12, the bipolar electrode 33 and the bipolar electrode 33, and the lower electrode 43, and having applied thrust to the zinc oxide component up block 31 and the zinc oxide component lower-berth block 41 between at each, respectively. the zinc oxide component upper case block 31 and the zinc oxide component lower-berth block 41 -- since it is alike, respectively and equal thrust is given, the lightning arrester of the stable high voltage with which a laminating condition being in a curve condition, or overflowing was avoided can be constituted.

[0022]

[Effect of the Invention] The lightning arrester which claim 1 of this invention requires a towage member between the stop section of the up electrode which equipped with the press means the upper limit side of two or more zinc oxide component blocks by which the laminating was carried out through the press plate, and the stop section of the lower electrode arranged in the lower limit side A cross

multiplication opium poppy, Since it considered as the configuration which led the lower electrode and applied thrust to the zinc oxide component block by binding the press bolt of an up electrode tight Equal thrust is given to a zinc oxide component block, and the stable lightning arrester with which it was avoided that a laminating condition becomes or overflows into a curve condition can be constituted.

[0023] The lightning arrester which claim 2 of this invention requires the stop section of the up electrode of the configuration of claim 1 and the stop section of a lower electrode Since the stop section of an up electrode and a lower electrode was formed so that the towage member by which tucking up its sleeves with a cord was carried out might be arranged equally at the periphery of a zinc-oxide component The thrust applied to the zinc oxide component block becomes homogeneity more, and the stable lightning arrester with which what overflows even if a load joins a zinc oxide component from a longitudinal direction was avoided can be constituted.

[0024] The lightning arrester which claim 3 of this invention requires in the middle which has arranged to the serial the zinc oxide component upper case block and zinc oxide component lower-berth block with which the laminating of two or more zinc oxide components was carried out The bipolar electrode equipped with the stop section of a towage member which leads a zinc oxide component upper case block, and the stop section of a towage member which leads a zinc oxide component lower-berth block is arranged. The up electrode which equipped with the stop section of a towage member a press means to press a zinc oxide component upper case block to the upper limit side of a zinc oxide component upper case block, and the flank is arranged. The lower electrode which equipped with the stop section of a towage member the both-sides section which equipped the lower limit side of a zinc oxide component lower-berth block with the press means is arranged through a press plate. The towage member formed in the shape of a ring of the insulating material which has tensile strength independently between the stop section of an up electrode, and one stop section of a bipolar electrode, and between [ each ] the stop section of another side of a bipolar electrode, and the stop section of a lower electrode A cross multiplication opium poppy, Since the zinc oxide component module was constituted so that thrust might be given to a zinc oxide component upper case block and each zinc oxide component lower-berth block and a bipolar electrode might be led with each press means of an up electrode and a lower electrode Also in a high electrical-potential-difference class lightning arrester, equal thrust is given to each block and the lightning arrester of the stable high voltage with which it was avoided that a laminating condition becomes or overflows into a curve condition can be constituted.

---

[Translation done.]

**\* NOTICES \***

**JPO and NCIPi are not responsible for any damages caused by the use of this translation.**

1. This document has been translated by computer. So the translation may not reflect the original precisely.
2. \*\*\*\* shows the word which can not be translated.
3. In the drawings, any words are not translated.

---

**TECHNICAL FIELD**

---

[Field of the Invention] This invention controls abnormal voltage generated in electric power system, such as a lightning surge and a switching surge, carries out the laminating of the zinc-oxide component which protects the electrical machinery and apparatus connected to the circuit, and relates to the lightning arrester on which the jacket formed of insulating materials, such as silicone rubber or other polymers, was put.

---

[Translation done.]

**\* NOTICES \***

JPO and NCIPi are not responsible for any damages caused by the use of this translation.

1. This document has been translated by computer. So the translation may not reflect the original precisely.
2. \*\*\*\* shows the word which can not be translated.
3. In the drawings, any words are not translated.

---

**PRIOR ART**

---

[Description of the Prior Art] As a lightning arrester on which the jacket which the laminating of the zinc-oxide component was carried out, and was formed in the periphery of the zinc-oxide component by which the laminating was carried out of insulating materials, such as silicone rubber or other polymers, was put, there are some which were indicated by JP,8-45709,A, for example. The configuration is shown in drawing 4. Drawing 4 (a) is [ the block diagram of a zinc oxide component module and drawing 4 R> 4 (c) of a sectional view and drawing 4 (b) ] the sectional views of the A-A section of drawing 4 (a). In drawing, the zinc oxide component block with which the laminating of the zinc oxide component 1a of plurality [ 1 ] was carried out, and 2 are up electrodes, and \*\*\*\* in which press \*\*\*\* which gives thrust to the zinc oxide component block 1 is screwed is prepared in the core.

[0003] 3 is a lower electrode and is formed like the up electrode 2. It is the towage member formed in the shape of a ring of the insulating material which presses the zinc oxide component block 1 by arranging 4 between the top face of the zinc oxide component block 1 by which the laminating was carried out, and the up electrode 2, and between the inferior surface of tongue of the zinc oxide component block 1, and the lower electrode 3, carrying out the suspension of the press plate which gives thrust equally to the zinc oxide component block 1, and 5 to the four way type between the up electrode 2 and the lower electrode 3, and leading the lower electrode 3.

[0004] When 6 is screwed in the screw thread of the core of the up electrode 2, the press bolt which gives thrust to the zinc oxide component block 1 by binding tight, and 7 are screwed in the screw thread of the core of the lower electrode 3, the press bolt which gives thrust to the zinc oxide component block 1 by binding tight, and 8 are twisted around the periphery of the towage member 5 and zinc oxide component 1a breaks, it is the burst prevention member which prevents dispersing around. 10 is the zinc oxide component module which consisted of the above 1-8. 9 is the jacket formed in the configuration which has a rib by insulating materials, such as wrap silicone rubber or other polymers, in the periphery of the zinc oxide component module 10.

[0005] Thus, dispersing around is prevented, when the zinc-oxide component 1 is supported firmly, and becomes excessive [ the current which absorbs abnormal voltage and flows ] and the constituted lightning arrester is destroyed electrically/thermally.

---

[Translation done.]

**\* NOTICES \***

JPO and NCIPi are not responsible for any damages caused by the use of this translation.

1. This document has been translated by computer. So the translation may not reflect the original precisely.
2. \*\*\*\* shows the word which can not be translated.
3. In the drawings, any words are not translated.

---

**EFFECT OF THE INVENTION**

---

[Effect of the Invention] The lightning arrester which claim 1 of this invention requires a towage member between the stop section of the up electrode which equipped with the press means the upper limit side of two or more zinc oxide component blocks by which the laminating was carried out through the press plate, and the stop section of the lower electrode arranged in the lower limit side A cross multiplication opium poppy, Since it considered as the configuration which led the lower electrode and applied thrust to the zinc oxide component block by binding the press bolt of an up electrode tight Equal thrust is given to a zinc oxide component block, and the stable lightning arrester with which it was avoided that a laminating condition becomes or overflows into a curve condition can be constituted.

[0023] The lightning arrester which claim 2 of this invention requires the stop section of the up electrode of the configuration of claim 1 and the stop section of a lower electrode Since the stop section of an up electrode and a lower electrode was formed so that the towage member by which tucking up its sleeves with a cord was carried out might be arranged equally at the periphery of a zinc-oxide component The thrust applied to the zinc oxide component block becomes homogeneity more, and the stable lightning arrester with which what overflows even if a load joins a zinc oxide component from a longitudinal direction was avoided can be constituted.

[0024] The lightning arrester which claim 3 of this invention requires in the middle which has arranged to the serial the zinc oxide component upper case block and zinc oxide component lower-berth block with which the laminating of two or more zinc oxide components was carried out The bipolar electrode equipped with the stop section of a towage member which leads a zinc oxide component upper case block, and the stop section of a towage member which leads a zinc oxide component lower-berth block is arranged. The up electrode which equipped with the stop section of a towage member a press means to press a zinc oxide component upper case block to the upper limit side of a zinc oxide component upper case block, and the flank is arranged. The lower electrode which equipped with the stop section of a towage member the both-sides section which equipped the lower limit side of a zinc oxide component lower-berth block with the press means is arranged through a press plate. The towage member formed in the shape of a ring of the insulating material which has tensile strength independently between the stop section of an up electrode, and one stop section of a bipolar electrode, and between [ each ] the stop section of another side of a bipolar electrode, and the stop section of a lower electrode A cross multiplication opium poppy, Since the zinc oxide component module was constituted so that thrust might be given to a zinc oxide component upper case block and each zinc oxide component lower-berth block and a bipolar electrode might be led with each press means of an up electrode and a lower electrode Also in a high electrical-potential-difference class lightning arrester, equal thrust is given to each block and the lightning arrester of the stable high voltage with which it was avoided that a laminating condition becomes or overflows into a curve condition can be constituted.

---

[Translation done.]



**\* NOTICES \***

JPO and NCIPi are not responsible for any damages caused by the use of this translation.

1. This document has been translated by computer. So the translation may not reflect the original precisely.
2. \*\*\*\* shows the word which can not be translated.
3. In the drawings, any words are not translated.

---

**TECHNICAL PROBLEM**

---

[Problem(s) to be Solved by the Invention] Although the conventional lightning arrester constituted as mentioned above needs have balanced engine performance, such as elongation over the die length and the load of each towage member 5, in order to give compressive force equally since the towage member 5 which presses the zinc oxide component block 1 is arranged at the surrounding four way type If there is dispersion in an actual product and there is a difference in the elongation over the die length of four towage members 5, and a load etc. With the configuration of drawing 4 bound tight with the press bolts 6 and 7 of each-one upper and lower sides, the thrust given to the zinc oxide component block 1 will incline, and the laminating condition of the zinc oxide component block 1 curved, and it had troubles, like zinc oxide component 1a overflows further.

[0007] The thrust which is made in order to cancel the above-mentioned trouble, and presses the zinc-oxide component by which the laminating was carried out is given equally, a laminating condition will be in a curve condition, or this invention will aim to let what overflows offer the lightning arrester avoided.

---

[Translation done.]

**\* NOTICES \***

JPO and NCIPi are not responsible for any damages caused by the use of this translation.

1. This document has been translated by computer. So the translation may not reflect the original precisely.
2. \*\*\*\* shows the word which can not be translated.
3. In the drawings, any words are not translated.

---

**MEANS**


---

[Means for Solving the Problem] The lightning arrester which claim 1 of this invention requires arranges the up electrode which equipped the upper limit side of two or more zinc oxide component blocks by which the laminating was carried out with the stop section by which the suspension of the towage member is carried out to a press means and the both-sides section through a press plate. The lower electrode which equipped the lower limit side with the stop section by which the suspension of the towage member is carried out to the both-sides section is arranged. The towage member formed in the shape of a ring of the insulating material which has tensile strength between the stop sections of an up electrode and a lower electrode A cross multiplication opium poppy, By giving thrust to a zinc oxide component block with a press means, and leading a lower electrode, give thrust to a zinc oxide component block and a zinc oxide component module is constituted. The jacket formed in the configuration which has a rib by the insulating material which equipped the periphery of this zinc oxide component module with weatherability and resiliency is put.

[0009] The stop section by which, as for the lightning arrester which claim 2 of this invention requires, the suspension of the towage member is carried out between the up electrode of the configuration of claim 1 and a lower electrode is formed so that the suspension of the towage member may be carried out to the flank of a zinc oxide component block at equal spacing.

[0010] The zinc oxide component upper case block and zinc oxide component lower-berth block with which the laminating of two or more zinc oxide components was carried out the lightning arrester which claim 3 of this invention requires in the both-sides section in the middle arranged at the serial The stop section of one towage member, The bipolar electrode which equipped with the stop section of the towage member of another side the both-sides section of the direction which intersects perpendicularly with this stop section is arranged. The upper limit side of a zinc oxide component upper case block is equipped with a press means to press a zinc oxide component upper case block. The up electrode which equipped the both-sides section with the stop section of a towage member is arranged through a press plate. To the lower limit side of a zinc oxide component lower-berth block, the lower electrode which equipped with the stop section of a towage member a press means to press a zinc oxide component lower-berth block, and the both-sides section is arranged through a press plate. It becomes independent between the stop sections of an up electrode and a bipolar electrode, and between [ each ] the stop sections of a bipolar electrode and a lower electrode. The towage member formed in the shape of a ring of the insulating material with tensile strength A cross multiplication opium poppy, By giving thrust to a zinc oxide component lower-berth block with the press means of a lower electrode, respectively, and leading a bipolar electrode to a zinc oxide component upper case block with the press means of an up electrode, respectively, give thrust and a zinc oxide component module is constituted. The jacket formed in the configuration which has a rib by the insulating material which equipped the periphery of this zinc oxide component module with weatherability and resiliency is put.

[0011]

[Embodiment of the Invention] The configuration of the gestalt 1 of gestalt 1. implementation of operation is shown in drawing 1 . Drawing 1 (a) is [ the side elevation of a zinc oxide component

module and drawing 1 (c) of the sectional view of a lightning arrester and drawing 1 (b) ] top views. In drawing, it is the up electrode arranged through the press plate 14 in the zinc oxide component block with which, as for 11, the laminating of the zinc oxide component 11a was carried out, and the upper limit side of the zinc oxide component block 11 with which the laminating of 12 was carried out, and the female screw with which it is equipped with the press bolt with which stop section 12a of the towage member 15 of the following [ section / both-sides ] is prepared, and presses the zinc oxide component block 11 to shaft orientations is formed. 13 is a lower electrode arranged in the lower limit side of the zinc oxide component block 11, and stop section 13a of the towage member 15 is prepared in the both-sides section like the up electrode 12. Slitting is put into the location of illustration and stop section 12a of the up electrode 12 and stop section 13a of the lower electrode 13 are formed in it so that the suspension of the towage member 15 can be carried out to shaft orientations in the shape of U character at each flank of the opposite side which touches the zinc oxide component block 11.

[0012] 15 is the towage member by which suspension was carried out between stop section 12a of the up electrode 12, and stop section 13a of the lower electrode 13, for example, is formed in the shape of a ring (endless) by the approach of winding fiber with tensile strength, such as a glass fiber or an aramid fiber, around predetermined magnitude, and infiltrating resin. 16 is a press bolt as a press means to push the press plate 14 and to give thrust to the zinc oxide component block 11, by thrusting. 20 is the zinc oxide component module which consisted of 11-16. 19 is a wrap jacket about the periphery of the zinc oxide component module 20, and is formed in the configuration which has a rib by insulating materials, such as silicone rubber or other polymers.

[0013] The constituted lightning arrester one towage member 15 in which the zinc oxide component block 11 was formed in the shape of a ring between stop section 12a of the up electrode 12, and stop section 13a of the lower electrode 13. Thus, a cross multiplication opium poppy, By adjusting allocation so that the die length of the flank of a zinc oxide component block of the towage member 15 may become the same, screwing in the press bolt 16, giving thrust to the zinc oxide component block 11, and leading the lower electrode 12. Equal thrust is given to the zinc oxide component block 11, a laminating condition can be in a curve condition, or the stable lightning arrester with which what overflows was avoided can be constituted.

[0014] The configuration of the gestalt 2 of gestalt 2. implementation of operation is shown in drawing 2. The gestalt 2 of operation is the almost same configuration as the gestalt 1 of operation, and it is constituted so that it can arrange at equal intervals to the flank of a zinc oxide component block of a towage member which gives thrust to a zinc oxide component block. Drawing 2 (a) is [ the block diagram of a zinc oxide component module and drawing 2 R> 2 (c) of the sectional view of a lightning arrester and drawing 2 (b) ] top views. In drawing, the zinc oxide component block 11, the press plate 14, the towage member 15, the press bolt 16, and a jacket 19 are the parts of the same as that of drawing 1 of the gestalt 1 of operation, or the same function.

[0015] 22 is an up electrode arranged through the press plate 14 in the upper limit side of the zinc oxide block 11. \*\*\*\* is established so that the press bolt as a press means can be screwed on, and stop section 22a of the towage member 15 is prepared in the both-sides section. The suspension of the towage member 15 is carried out to shaft orientations at the shape of U character, stop section 22a is the flank of the zinc oxide component block 11, and slitting is put in and it is formed so that it may be arranged in parallel by regular intervals. 23 is an up electrode arranged in the lower limit side of the zinc oxide block 11, and stop section 23a is formed like the up terminal 22. 30 is 11, 14-16, and the zinc oxide module that consisted of 22 and 23. After the zinc oxide component module 30 is assembled, the jacket formed in the configuration which carries out chlorine oxide and has a rib by insulating materials, such as silicone rubber or other polymers, on a modular periphery is put.

[0016] Since it is adjusted so that the towage member 15 formed in the shape of a ring may become the perimeter of the zinc oxide component block 11 in this configuration and four may become the same die length, and it is arranged at equal intervals at the flank of the zinc oxide component block 11. The thrust applied to the zinc oxide component block 11 becomes more uniform than the case of the gestalt 1 of operation, and the lightning arrester by which what overflows even if a load joins zinc oxide component

11a from a longitudinal direction was stabilized rather than the gestalt 1 of the avoided operation can be constituted.

[0017] The configuration of the gestalt 3 of gestalt 3. implementation of operation is shown in drawing 3. The gestalt 3 of operation is a gestalt of operation in case the zinc oxide component block which carried out the laminating is arranged in two steps, an upper case and the lower berth. It is the top view where drawing 3 (a) saw the sectional view of a lightning arrester, and drawing 3 (b) saw the block diagram of a zinc oxide component module, and drawing 3 (c) from the top face of a lightning arrester. In drawing, the zinc oxide component upper case block with which the laminating of the zinc oxide component 11a of plurality [ 31 ] was carried out, and 41 are the zinc oxide component lower-berth blocks with which the laminating of the zinc oxide component 11a was carried out.

[0018] 32 is arranged through the press plate 34 in the upper limit side of the zinc oxide component upper case block 31. The up electrode with which stop section 32a of the towage member which carries out the following to the both-sides section was prepared, and \*\*\*\* on which the press bolt as a press means to press the zinc oxide component block 31 from a top face is screwed was established, 33 is arranged between the zinc oxide component upper case block 31 and the zinc oxide component lower-berth block 41. Stop section 33a which carries out the suspension of the upper following towage member 35 to the both-sides section is prepared. The bipolar electrode with which stop section 33b which carries out the suspension of the downward following towage member 45 to the both-sides section of the direction which intersects perpendicularly with this stop section 33a was prepared, and 43 are the above-mentioned up electrode arranged through the press plate 34 in the lower limit side of the zinc oxide component lower-berth block 41, and the lower electrode formed similarly.

[0019] 35 the fiber which was manufactured like the towage member 15 of the gestalt 1 of the operation by which tucking up its sleeves with a cord was carried out between stop section 32a of the up electrode 32, and one stop section 33a of a bipolar electrode 33 and which has tensile strength, such as a glass fiber or an aramid fiber, for example in the shape of [ of predetermined magnitude ] a ring Winding, The towage member formed in the shape of a ring by the approach of infiltrating resin and hardening and 45 are the towage members formed like 35 by which tucking up their sleeves with a cord was carried out between stop section 33b of another side of a bipolar electrode 33, and stop section 43a of the lower electrode 43.

[0020] It is a press bolt as a press means for 36 to be screwed on the screw thread of the up electrode 32, and for the press bolt as a press means to press the press plate 34 and to give thrust to the zinc oxide component block 31 by thrusting, and 46 to be screwed on the screw thread of the lower electrode 43, to press the press plate 34 by thrusting, and to give thrust to the zinc oxide component block 41. 40 is 31-36, and the zinc oxide component module that consisted of 41, 43, 45, and 46. 39 is a wrap jacket about the periphery of the zinc oxide component module 40, and is formed in the configuration which has a rib by insulating materials, such as silicone rubber or other polymers.

[0021] It is a configuration in the case of a comparatively high electrical-potential-difference class stationed in this configuration to two steps, the zinc oxide component upper case block 31 which carried out the laminating of the zinc oxide component 11a, and the zinc oxide component lower-berth block 41. It also sets to a high electrical-potential-difference class lightning arrester by having carried out tucking up its sleeves with a cord of the towage members 35 and 45 according to the individual between the up electrode 12, the bipolar electrode 33 and the bipolar electrode 33, and the lower electrode 43, and having applied thrust to the zinc oxide component up block 31 and the zinc oxide component lower-berth block 41 between at each, respectively. the zinc oxide component upper case block 31 and the zinc oxide component lower-berth block 41 -- since it is alike, respectively and equal thrust is given, the lightning arrester of the stable high voltage with which a laminating condition being in a curve condition, or overflowing was avoided can be constituted.

---

[Translation done.]

**\* NOTICES \***

JPO and NCIPi are not responsible for any damages caused by the use of this translation.

- 1.This document has been translated by computer. So the translation may not reflect the original precisely.
- 2.\*\*\*\* shows the word which can not be translated.
- 3.In the drawings, any words are not translated.

---

**DESCRIPTION OF DRAWINGS**

---

**[Brief Description of the Drawings]**

**[Drawing 1]** It is the block diagram of the lightning arrester of the gestalt 1 of operation, and (a) is [ the block diagram of a zinc oxide component module and (c of a sectional view and (b)) ] top views.

**[Drawing 2]** It is the block diagram of the lightning arrester of the gestalt 2 of operation, and (a) is [ the block diagram of a zinc oxide component module and (c of a sectional view and (b)) ] top views.

**[Drawing 3]** It is the block diagram of the lightning arrester of the gestalt 3 of operation, and (a) is [ the block diagram of a zinc oxide component module and (c of a sectional view and (b)) ] top views.

**[Drawing 4]** It is the block diagram of the conventional lightning arrester, and (a) is a sectional view and (b) is the block diagram of a zinc oxide component module.

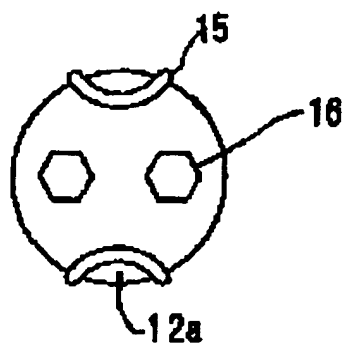
**[Description of Notations]**

11 Zinc Oxide Component Block, 12 Up Electrode, 13 Lower Electrode, 14 A press plate, 15 A towage member, 16 A press bolt, 19 Jacket, 20 A zinc oxide component module, 22 An up electrode, 23 Lower electrode, 31 A zinc oxide component upper case block, 32 An up electrode, 33 Bipolar electrode, 34 A press plate, 35 A towage member, 36 A press bolt, 39 A jacket, 40 A zinc oxide component module, 41 A zinc oxide component lower-berth block, 43 A lower electrode, 45 A towage member, 46 Press bolt.

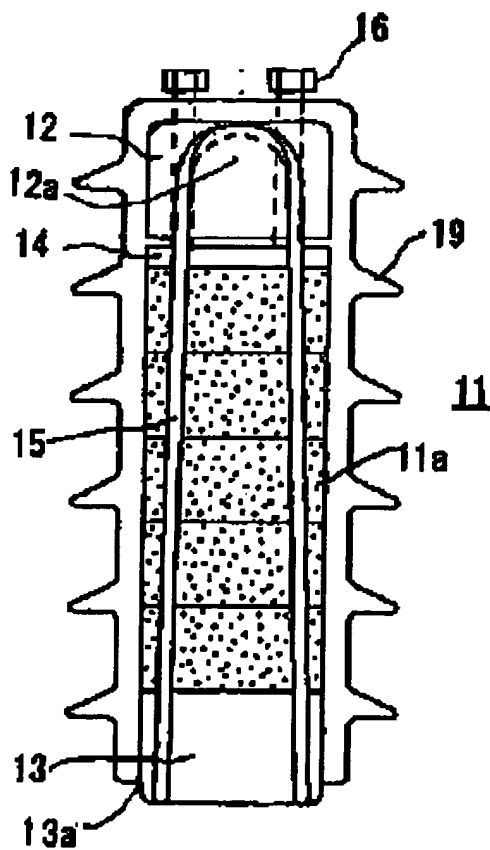
---

[Translation done.]

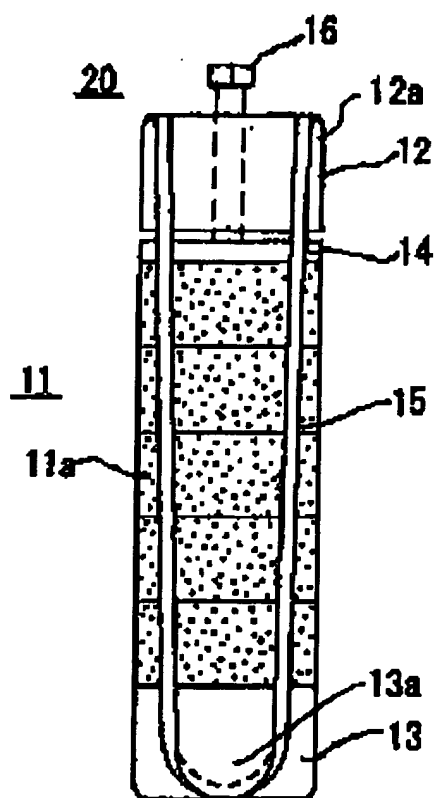
(c)



(a)



(b)



11 : 酸化亜鉛素子ブロック

13 : 下部電極

15 : 牽引部材

19 : 外被

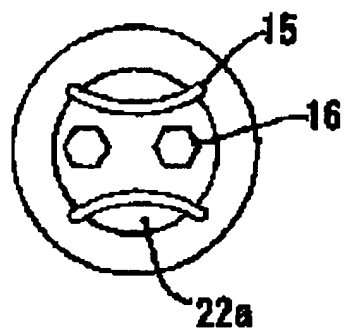
12 : 上部電極

14 : 押圧板

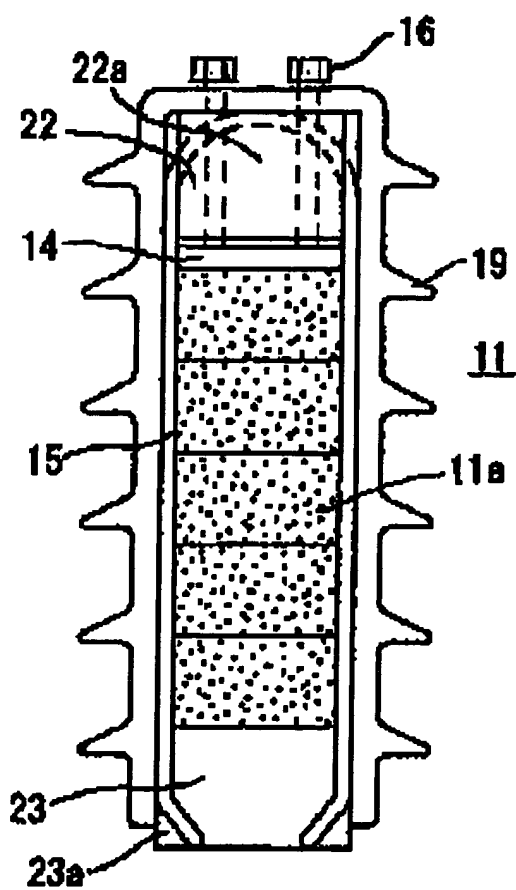
16 : 押圧ボルト

20 : 酸化亜鉛素子モジュール

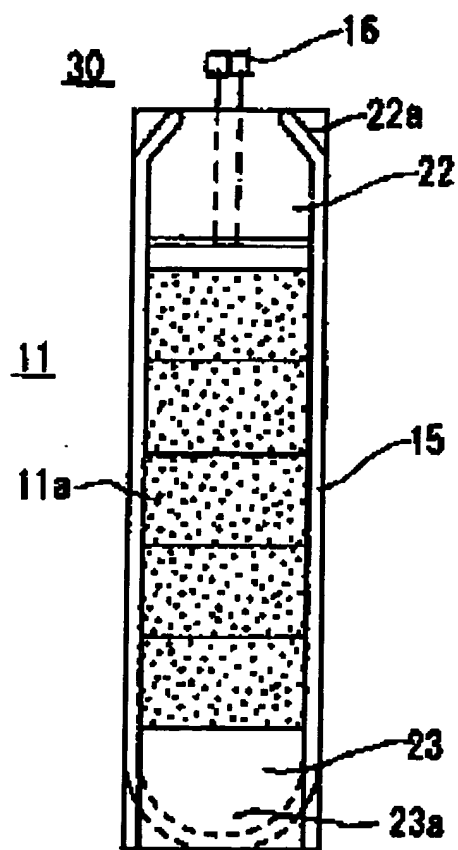
(c)



(a)

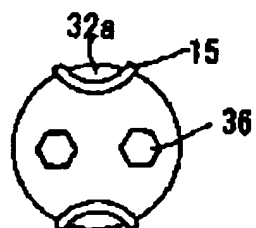


(b)

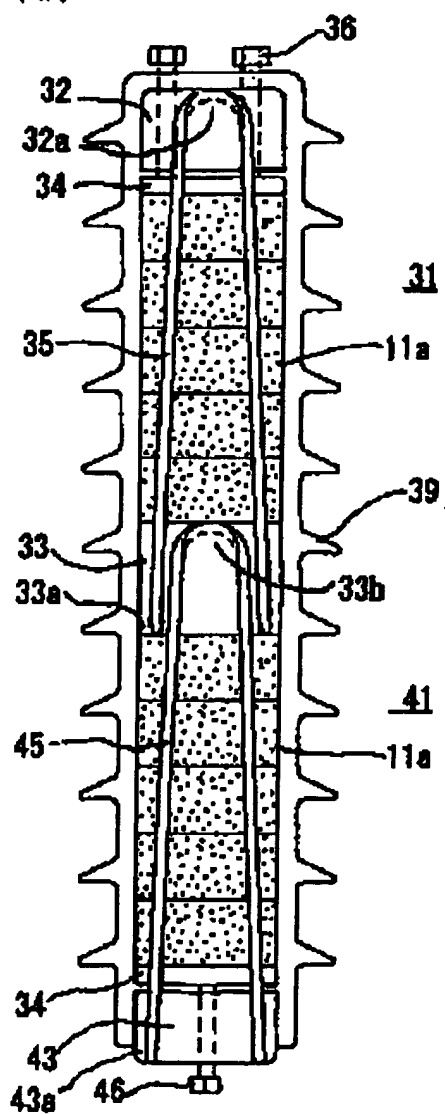


22 : 上部電極  
23 : 下部電極  
30 : 酸化亜鉛素子モジュール

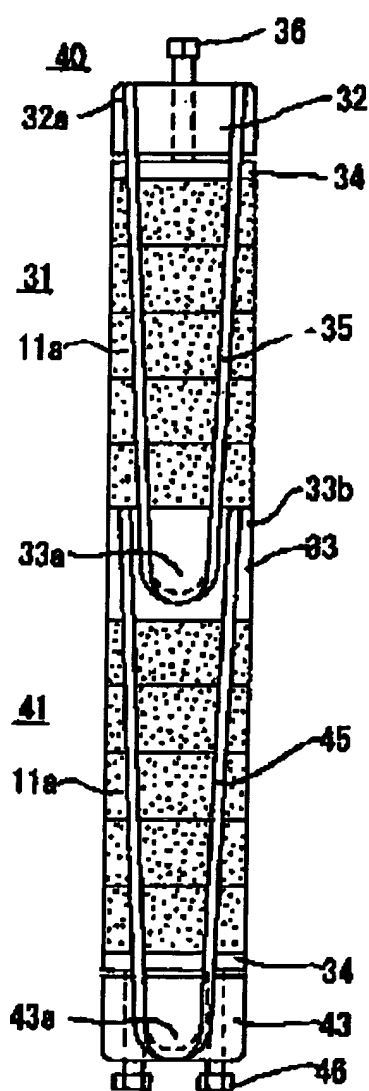
(c)



(a)



(b)

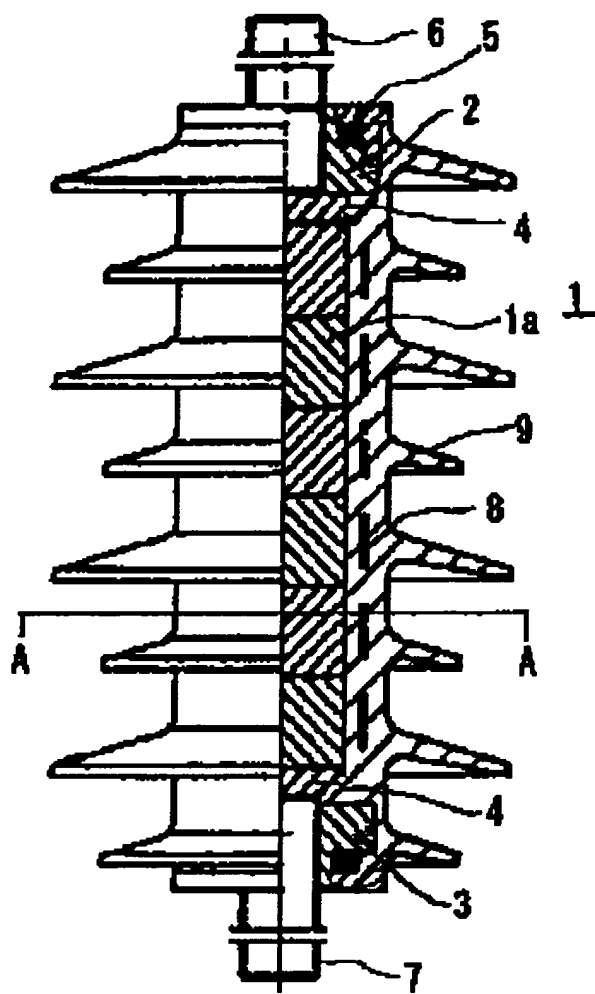


31 : 酸化亜鉛素子上段ブロック  
34 : 押圧板  
40 : 酸化亜鉛素子モジュール  
43 : 下部電極

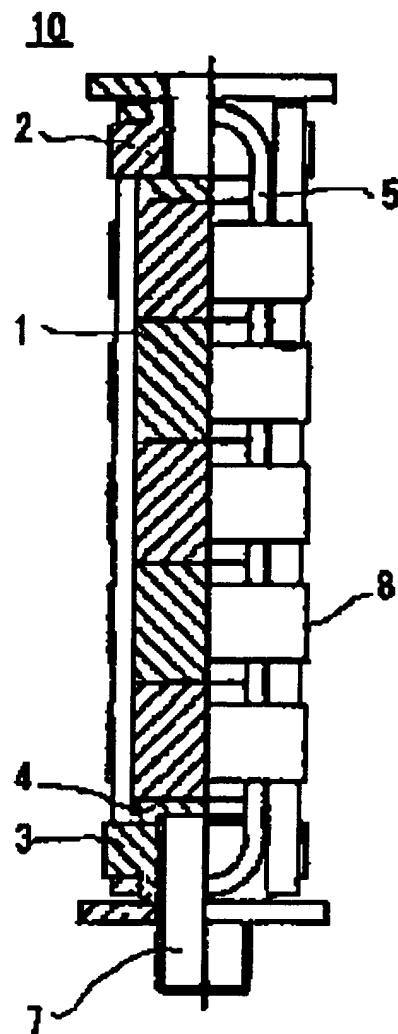
32 : 上部電極    33 : 中間電極  
35 : 牽引部材    36 : 押圧ボルト  
41 : 酸化亜鉛素子下段ブロック  
45 : 牽引部材    46 : 押圧ボルト



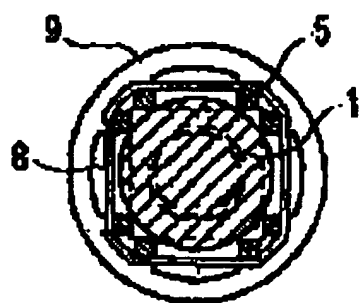
(a)



(b)



(c)



**This Page is Inserted by IFW Indexing and Scanning  
Operations and is not part of the Official Record**

**BEST AVAILABLE IMAGES**

Defective images within this document are accurate representations of the original documents submitted by the applicant.

Defects in the images include but are not limited to the items checked:

- ☐ BLACK BORDERS
  - ☐ IMAGE CUT OFF AT TOP, BOTTOM OR SIDES
  - ☐ FADED TEXT OR DRAWING
  - ☒ BLURRED OR ILLEGIBLE TEXT OR DRAWING
  - ☐ SKEWED/SLANTED IMAGES
  - ☐ COLOR OR BLACK AND WHITE PHOTOGRAPHS
  - ☐ GRAY SCALE DOCUMENTS
  - ☐ LINES OR MARKS ON ORIGINAL DOCUMENT
  - ☐ REFERENCE(S) OR EXHIBIT(S) SUBMITTED ARE POOR QUALITY
- 

☐ OTHER: \_\_\_\_\_

**IMAGES ARE BEST AVAILABLE COPY.**

**As rescanning these documents will not correct the image problems checked, please do not report these problems to the IFW Image Problem Mailbox.**